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State of Utah
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DIVISION OF OIL, GAS AND MINING

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March 10, 1997

TO: Folder #2

THRU: Daron Haddock, Permit Supervisor DRH

FROM: Robert Davidson, Soils Reclamation Specialist RAD

RE: Five Year Permit Renewal - Permit Change, Soldier Canyon Mine, Soldier Creek Coal Company, ACT/007/018-96A, Folder #2, Carbon County, Utah

ENVIRONMENTAL RESOURCE INFORMATION
SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.21, 817.200(c); R645-301-220, -301-411.

Analysis:

Soldier Creek Coal Company (SC3) submitted with their Five Year Permit Renewal, permit changes within their Mine Reclamation Plan (MRP). Most of these changes are associated with the Waste Rock Disposal Area for disposal of underground development waste. **By definition, the waste rock disposal area is simply a refuse pile**. "**Refuse Pile**" means a surface deposit of *coal mine waste* that does not impound water, slurry, or other liquid or semi-liquid material. **"Coal Mine Waste**" is defined as coal processing waste and *underground development waste*. Finally, "**Underground Development Waste**" specifies waste-rock mixtures of coal, shale, claystone, siltstone, sandstone, limestone, or related materials that are excavated, moved, and disposed of from underground workings in connection with underground coal mining and reclamation activities. The permit changes associated with the waste rock disposal area will therefore be analyzed accordingly using the above definitions for refuse piles, coal mine waste, and underground development waste.

Prime Farmland Investigation

Prime Farmland Investigations by the Natural Resource Conservation Service (NRCS), formerly the Soil Conservation Services (SCS), show that Prime Farmland exits within the NE¼

of the NE¼ of Section 36, T13S, R11E. This area is located immediately south of the proposed waste rock disposal area and is associated with the Hernandez family soil. This soil unit is in the capability class IIIe-2, irrigated unit. As shown on the soils map for the waste rock disposal area, the Hernandez family soil unit continues north of the Prime Farmland area and lies between the waste rock disposal area and the county road. The upper end of the Hernandez soil contains the Topsoil Storage area. The southern border of the Topsoil Storage area is defined by an old irrigation ditch that diagonally crosses, on a southwest angle, the upper tongue of the Hernandez soil unit. The ditch eventually continues south along the western border of the soil unit. Historically, this ditch was used to irrigate the southern portion of Hernandez soil below the topsoil storage area. *Leland Sassar of the NRCS on February 26, 1997, gave verbal acknowledgment to the Division for a positive Prime Farmland determination of the Hernandez soil immediately south of the irrigation ditch. In response to the verbal acknowledgment, the Division has requested the NRCS to make a new Prime Farmland reconnaissance investigation for the area (Sections 24 and 36, T13S, R11E). Consequently, the NRCS will make a formal Prime Farmland investigation of the area with written verification or refutation to the Division. If Prime Farmland exists within the permit area adjacent to the waste rock disposal area, then SC3 must provide all applicable information and adhere to all applicable regulations as outlined in R645-302-310.*

Soil Survey

The applicant has provided a soil survey for the waste rock disposal area. Initial field soil investigations were conducted in May, 1990, and consisted of four test pits (OTP 1 thru 4). A supplemental field investigation was conducted in April, 1991 and consisted of five stream bank sections (SCC 1 thru 5), four test pits (TP 1 thru 4) and ten auger holes (AH 1 thru 10). Three soil mapping units were identified during these investigations and are mapped in Figure 1, Refuse Disposal Area, Order 1 Soils Map. Soils descriptions are taken from the Carbon Area Soil Survey with some text modifications made in the MRP section 2.22, Soil Survey, to represent the exact field conditions encountered at the waste rock disposal area. Field soil descriptions are located in Appendix 2-B. Soil identifications are as follows:

- Hernandez Soil - a tongue of soil immediately east and contiguous to the waste rock disposal area. The upper portion of this soil group contains the 4.5 acre topsoil storage area which is represented by soil sample OTP #1. Non-irrigated soils are in capability subclass VIe and are generally unsuitable for cultivation. The prime farmland irrigated soil is in capability unit IIIe-2. Unprotected soils are highly susceptible to errosion.

  The Hernandez soil unit consists of very deep, well drained soils developed on fan

terraces. These soils formed in alluvium derived from sandstone and shale. Slopes are 1 to 8 percent. The soil is fine loamy, mixed, mesic Ustollic Calciothids.

- Gerst-Badland Complex - Includes the hillslopes and upper elevations of the waste rock disposal area and is represented by soil samples OTP #2 and #4. The Gerst soil is in capability class VIIe non-irrigated soil and is unsuitable for cultivation. The Badland soil is in capability class VIIIe and are precluded from being used for crop production. Both soils are highly susceptible to erosion.

  This series consists of shallow, well drained, moderately permeable soils on mesa sideslopes, benches, terraces and canyons and on mountain slopes and hillslopes. These soils formed in residuum and colluvium derived from shale and sandstone. The slope averages 30 to 70 percent. The soils are loamy, mixed (calcareous) mesic shallow Usitic Torriorthents. Deeper horizons are partly weathered Mancos Shale with a paralithic contact at 18-20 inches.

- Haverdad Soil - Includes the soils confined to the valley floor of the waste rock disposal area. The area is represented by soil samples OTP #3, TP 1 through 4, AH 1 through 10, and SCC 1 through 5. Non-irrigated soils are in capability subclass VIe, are generally unsuitable for cultivation, and are highly susceptible to erosion. When irrigated, this soil unit is in capability class IIIe-2.

  The Haverdad soils are deep, well drained, moderately permeable soils on fan terraces and valley floors. These soils formed in stratified alluvium derived from sandstone and shale. Slopes average 1 to 8 percent. The soils are fine-loamy, mixed (calcareous) mesic Ustic Torrifluvents.

Table 2.22-4 lists the potential productivity of soil mapping units. Values are taken from the SCS Soils Interpretation Records for the Carbon Soil Survey Area. The MRP states that the soil units occurring at the waste rock disposal site limit the present and potential productivity for the area. Present productivity of selected vegetation communities in terms of herbaceous and shrub stratum components can be found in Chapter 3, Appendix 3-D.

Soil Characterization

The MRP states that "... soil surveys were conducted according to procedures by the Soil Survey Staff of the USDA ..." *Although field soil descriptions are located in Appendix 2-B for the waste rock area soil survey, the descriptions are lacking specificity and do not adhere to the standards of the National Cooperative Soil Survey (R645-302-314.100). In addition, soil pit*

density is lacking to adequately assess the Hernandez and Gerst-Badland Complex soils for an Order I soil survey.

Substitute Topsoil

There is limited thickness or total absence of A and B horizons in the Haverdad Series and the Gerst-Badland complex soils. Therefore, the subsoil from these soil groups will be used as substitute topsoil. Acceptance of these subsoils as substitute topsoil is based on the chemical and physical analyses as outlined by the Division's guidelines for topsoil and overburden[1].

Mine Development Waste

Based on preliminary analyses of material similar to those which will be placed in the refuse site, the MRP states that no acid or toxic-forming problems are anticipated with the mine's underground development waste (see Appendix 6-B). *The conclusion that the underground development waste is neither acid nor toxic forming is based on the assumption that the waste material analyzed in 1989 is the same as waste material to be mined in 1997 or later. This assumption is erroneous since it is based on obsolete data.*

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-221 and R645-302-310: Leland Sassar of the NRCS on February 26, 1997, gave verbal acknowledgment to the Division for a positive Prime Farmland determination of the Hernandez soil immediately south of the irrigation ditch. In response to the verbal acknowledgment, the Division has requested the NRCS to make a new Prime Farmland reconnaissance investigation for the area (Sections 24 and 36, T13S, R11E). Consequently, the NRCS will make a formal Prime Farmland investigation of the area with written verification or refutation to the Division. If Prime Farmland exists within the permit area adjacent to the waste rock disposal area, then SC3 must provide all applicable information and adhere to all applicable regulations as outlined in R645-302-310.

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[1]Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

R645-301-223 and R645-302-314.100: Although field soil descriptions are located in Appendix 2-B for the waste rock area soil survey, the descriptions are lacking specificity and do not adhere to the standards of the National Cooperative Soil Survey (R645-302-314.100). In addition, soil pit density is lacking to adequately assess the Hernandez and Gerst-Badland Complex soils for an Order I soil survey.

R645-301-121.100: The conclusion that the underground development waste is neither acid nor toxic forming is based on the assumption that the waste material analyzed in 1989 is the same as waste material to be mined in 1997 or later. This assumption is erroneous since it is based on obsolete data.

OPERATION PLAN
TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

Analysis:

Soil Salvage - Waste Rock Disposal Area

The waste rock material will be sampled and analyzed for acid and toxic-forming potential on a quarterly basis. Should a problem be identified, SC3 commits to developing a mitigation plan for DOGM's approval, and thereby disposing of all acid and/or toxic-forming materials in accordance with an approved plan. *Enough fill and soil cover should be salvaged from the waste rock storage site to provide the minimum four feet of cover for the refuse pile surface and final face. Then, if an acid or toxic problem is identified during the quarterly sampling, the needed minimum cover will already be provided.*

All topsoil and subsoil resources that could be potentially disturbed or covered by disposal activities will be removed and salvaged, unless it would be unsafe or impractical because of slope, rockiness or limited soil depth. Plans for soil removal and sequence of removal are contained in Sections 2.32 and 5.28 of the MRP. In summary, the excavation of soil will take place sequentially, removing only the amount of soil from the area required for waste rock disposal. This procedure will prevent undue exposure of soil and allow vegetation to remain in place until the area is required for waste rock placement. Sequential excavation also will aid in maintaining the existing physical and chemical characteristics of the undisturbed soils. The waste rock pile will be constructed in segments starting at the top of the ravine. As each segment is finished, the pile surface will be regraded for final topographic configuration and then covered

with the excavated fill and topsoil. Future sequential stripping of topsoil and subsoil fills from the expansion sections will be placed directly on the regraded areas, thus minimizing the amount of double handling of materials.

Initially, the soil will be stripped and stockpiled from the areas to be used for access roads and two small work areas within the disposal area. These two small areas are located in the upper disposal site drainage area and in the lower drainage area for the construction of the sediment pond.

Soldier Creek Coal Company is planning to salvage soil from the steeper sideslopes of the disposal area drainage. According to the Division's guidelines, the rock fragment percentage in this area is high. Salvage operations will continue until SC3 determines that the operations have become unsafe or impractical due to slope and/or rockiness of the slope soils. SC3 will confer with the DOGM for approval of the decision to cease soil salvage on the steep slopes. *In non-prime farmland areas, the Division currently does not consider high percentages of coarse rock fragments as a limiting factor in mine reclamation soils. A certain amount of coarse fragments can be tolerated depending upon the size of fragment and on the intended use of the reclaimed area.*

Once the soil materials required have been stripped from an area proposed for storage of waste rock material, SC3 plans to excavate the subsoil materials. These materials will be used as fill to cover the waste rock before redistribution and placement of the soil materials. The depth of subsoil in the upper portions of the disposal area drainage will be thinner than in the lower portions of the drainage.

In those areas where the topsoil (A and B horizons) is less than six inches thick, soil salvage will include both the topsoil and a portion of the subsoil materials (C horizons) as a mixture. Otherwise, topsoil and subsoil will be segregated with the subsoil being used as substitute topsoil and initial cover as explained above. The plan states that an average of 18 inches of soil will be salvaged. As with the subsoils, topsoil in the upper end of the disposal area are anticipated to be limiting in depth due to head cutting of the drainage and contact with Mancos Shale. Soils in the lower drainage are much thicker; SC3 commits to salvaging additional soil volumes where deeper soils of suitable quality exist. *Soil salvage should be based on soil survey results, recoverable soil depth and needed soil reclamation volumes, not on a stated value of 18 inches. A professional soil scientist needs to be available during salvage operations for insuring optimum soil salvage, proper excavation and separation of adequate quantities of topsoil and subsoil. Soil salvage information needs to be presented and correlated with reclamation efforts for obtaining the needed four feet minimum cover of soils and fills for the entire surface and future face of the waste rock pile. Based on the four feet minimum cover*

requirement, soil salvage depth and projected salvage volumes need to be provided for the waste rock disposal area.

The MRP states that before any soil removal, vegetation will be burned or cleared and buried. *Only vegetation cover that would interfere with soil salvage should be removed. All other vegetation should be salvaged with the soil; live haul of soil materials will heighten reclamation and revegetation success. The applicant should save all removed vegetation material to be placed and/or incorporated in the surface of the topsoil pile.*

Topsoil Storage Area

The present topsoil storage site is approved for storage of topsoil, substitute topsoil and landscape boulders. Currently, the 4.5 acre site has four piles occupying 2.3 acres with material salvaged from surface facilities expansion and road relocation areas. The remainder 2.2 acres will be used for storing topsoil and substitute topsoil salvaged from the waste rock disposal site, and from the proposed Dugout Canyon mine site. Soil from The Dugout Canyon mine site will be stored exclusively in a designated area which is separate from the other piles. Any further placement of topsoil necessitates the formation of new soil piles to eliminate disturbance to the currently established piles.

Topsoil will be stripped from the topsoil storage site's remaining 2.2 acres prior to placement of any salvaged soil. All salvaged and stockpiled topsoil/substitute topsoil will be protected from excessive erosion and instability by placing the soil on a stable site with proper identification signs, by establishing runoff control and diversion measures, by establishing an interim vegetation cover, and by not disturbing the topsoil until redistribution.

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-232: (1) Soil salvage information needs to be presented and correlated with reclamation efforts for obtaining the needed four feet minimum cover of soils and fills for the entire surface and future face of the waste rock pile. Based on the four feet minimum cover, soil salvage depth and projected salvage volumes need to be provided for the waste rock disposal area. (2) A professional soil scientist needs to be available during salvage operations for insuring optimum soil salvage, proper excavation and separation of adequate quantities of topsoil and subsoil. Soil salvage should be based on soil survey results, recoverable soil depth and needed soil

reclamation volumes, not on a stated value of 18 inches. (3) In non-prime farmland areas, the Division currently does not consider high percentages of coarse rock fragments as a limiting factor in mine reclamation soils. A certain amount of coarse fragments can be tolerated depending upon the size of fragment and on the intended use of the reclaimed area. (4) Only vegetation cover that would interfere with soil salvage should be removed. All other vegetation should be salvaged with the soil; live haul of soil materials will heighten reclamation and revegetation success. The applicant should save all removed vegetation material to be placed and/or incorporated in the surface of the topsoil pile.

RECLAMATION PLAN
TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

Analysis:

Waste Rock Disposal Site

Soldier Creek Coal Company plans to place a fill cover of 24 to 30 inches and 6 to 12 inches of topsoil over the waste rock. This cover is based on the assumption that the material is neither acid nor toxic forming. The plan states that in the event that acid or toxic forming materials are identified, then SC3 will cover the waste rock with a minimum of four feet of the best available, nontoxic and noncombustible material. *Following final grading of any refuse pile, the coal mine waste will be covered with a minimum of four feet of cover. As discussed in the Operation Section and in the event that an acid or toxic problem is identified, enough fill and soil cover should be salvaged from the waste rock storage site to provide the minimum four feet of cover for the refuse pile surface and final face. If the acid and/or toxic problem is critical, SC3 needs to commit for developing additional mitigation that will help offset any potential environmental harm.*

The waste rock pile will be constructed in segments. Each segment will be reclaimed as each portion of the site is exhausted. The surface of the filled sections will be graded to the final topographic configuration. The waste rock consisting of cobble size fragments of shale, sandstone and siltstone will be re-worked at the surface to break down large pieces and then compacted. After regrading and surface preparations are complete, the fill material will be uniformly placed over the waste rock. During the placement of the fill, the area will be adequately compacted to provide a stable fill cover and to prevent slippage of the fill materials.

Following the placement of the fill materials, the soils will be placed uniformly over the entire fill area and scarified to a depth of at least 10 inches. *Scarification and/or ripping of the compacted fill material should take place before the topsoil is applied. Scarification helps relieve the effects of excessive compaction, reduces potential slippage of the fills, promotes water infiltration and encourages root penetration. After the topsoil is applied, additional surface roughening of the soil surface by deep gouging and rock placement will provide micro-environments that encourage seed germination and promote water harvesting.*

During topsoil placement, random excavations will be taken of the topsoil fill to ensure compliance. After final grade is achieved, random sampling of the soil will help determine fertilizer requirements. Analyses will include pH, texture, percent organic matter, ammonium and nitrate nitrogen, phosphorus, potassium, electrical conductivity, and sodium absorption ratio.

Based on current soil nutrient levels of the Hernandez soil, fertilization rates are projected for the topsoil storage area and for the waste rock disposal area. The plan proposes to add nitrogen by applying 88 pounds per acre of sulfur coated urea, 45-0-0. Treble superphosphate, 0-46-0, will be applied at 65 pounds per acre. The plan states that potassium concentrations are within the desirable levels for successful revegetation. *Based on the given soil test results presented in Table 2.42-1, the Division has determined that fertilizer recommendations are in error. The nitrate-nitrogen levels range from 101 to 510 ppm and are completely within desirable levels for successful revegetation; therefore, no nitrogen is needed. Phosphorus levels range from 0.22 to 2.74 ppm. These phosphorus levels are low; therefore, 50 to 70 pounds per acre of P_2O_5 are needed. Potassium concentrations range from 4.5 to 62 ppm. These potassium levels are extremely low and are not within acceptable limits. Potassium fertilization rates should range between 140 to 220 pounds of K_2O per acre. These fertilization rates are based on dryland farming conditions for wheat.*

Soldier Canyon Mine

Appendix 5E, Reclamation Mass Balance Calculations, shows the total of excess cut material to be 20,602 yd^3. The appendix discussion concludes that the best use of this material would be for the final face of the refuse pile, providing 4 feet of cover. *The needed soils and fills for the four feet of cover on the final face of the refuse pile should be salvaged from the waste rock disposal area, not obtained from the 20,602 yd3 of excess cut material. The excess cut material could then be used to supplement the 10,994 yd3 of topsoil and substitute topsoil for reclaiming pre- and post-SMCRA areas. This extra supplement would enhance reclamation efforts by providing a much deeper soil cover than the projected five and 12 inches slated for the pre- and post-SMCRA areas, respectively.*

Soil salvage and reclamation summary information needs to be updated, corrected and clarified for all topsoil and substitute topsoil yardage volumes, acreage, and needed reclamation volumes as contained in Section 2.32 and Appendix 5E. Projected volumes and area descriptions seem to conflict and/or don't agree. Check information for accuracy, consistency and clarity. Appendix 5E needs to be updated for the waste rock disposal area.

Findings:

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-553.250 and R645-301-553.300: Following final grading of any refuse pile, the coal mine waste will be covered with a minimum of four feet of cover. As discussed in the Operation Section and in the event that an acid or toxic problem is identified, enough fill and soil cover should be salvaged from the waste rock storage site to provide the minimum four feet of cover for the refuse pile surface and final face. If the acid and/or toxic problem is critical, SC3 needs to commit for developing additional mitigation that will help offset any potential environmental harm.

R645-301-242.200: Scarification and/or ripping of the compacted fill material should take place before the topsoil is applied. Scarification helps relieve the effects of excessive compaction, reduces potential slippage of the fills, promotes water infiltration and encourages root penetration. After the topsoil is applied, additional surface roughening of the soil surface by deep gouging and rock placement will provide micro-environments that encourage seed germination and promote water harvesting.

R645-301-243: Based on the given soil test results presented in Table 2.42-1, the Division has determined that fertilizer recommendations are in error. The nitrate-nitrogen levels range from 101 to 510 ppm and are completely within desirable levels for successful revegetation; therefore, no nitrogen is needed. Phosphorus levels range from 0.22 to 2.74 ppm. These phosphorus levels are low; therefore, 50 to 70 pounds per acre of P_2O_5 are needed. Potassium concentrations range from 4.5 to 62 ppm. These potassium levels are extremely low and are not within acceptable limits. Potassium fertilization rates should range between 140 to 220 pounds of K_2O per acre. These fertilization rates are based on dryland farming conditions for wheat.

R645-301-233.100: The needed soils and fills for the four feet of cover on the final face of the refuse pile should be salvaged from the waste rock disposal area, not obtained

from the 20,602 yd3 of excess cut material. The excess cut material could then be used to supplement the 10,994 yd3 of topsoil and substitute topsoil for reclaiming pre- and post-SMCRA areas. This extra supplement would enhance reclamation efforts by providing a much deeper soil cover than the projected five and 12 inches slated for the pre- and post-SMCRA areas, respectively.

R645-301-120: Soil salvage and reclamation summary information needs to be updated, corrected and clarified for all topsoil and substitute topsoil yardage volumes, acreage, and needed reclamation volumes as contained in Section 2.32 and Appendix 5E. Projected volumes and area descriptions seem to conflict and/or don't agree. Check information for accuracy, consistency and clarity. Appendix 5E needs to be updated for the waste rock disposal area.

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